27. (Unchanged) A method as in claim 25, wherein the at least magnetic field coupling device is a reverse power coupler.

28. (Once Amended) A method as in claim 25, wherein the at least one transmission line is a microstrip, the upper interconnecting structures are air bridges and the second plurality of lower interconnecting structures are strip line.

29. (Twice Amended) A method as in claim 25, wherein the at least one transmission line, the upper interconnecting structures and the lower interconnecting structures are a stripline resonator.

R E M A R K S

In the final office action, Applicant notes with appreciation the allowance of claim 1 and indication of allowable subject matter in claims 2-3, 4-11, 12-24 and 25-29. Claims 2-3, 4-11, 12-24, 25-29 and 30-31 were rejected under 35 U.S.C. §112(2) while claims 30 and 31 were rejected under §102(b). The Examiner further noted a number of informalities with previously entered amendments. In response thereto, claims 2-4,11-15,17,20,23-25 and 28-29 have now been amended and claims 30-31 have been canceled. Claims 1-17 and 19-29 remain in the application. In view of this amendment and remarks herein, reconsideration is respectfully requested.

The present invention is directed to a coupling device as seen in FIG. 3 that consists of upper and lower connecting plates 100 and 101 with external flanges parallel to transmission line (103) for coupling RF energy for forward power detection. The coupling device (100) incorporates a helix structure with rotation centered near or about transmission line

103 and incorporates embedded secondary structures which are parallel to transmission line and fixed a predetermined distance from the transmission line (103). These plurality of parallel flanges are used to increase the coupling coefficient and directivity of the helix coupler (107) and maintain geometries that optimize magnetic field coupling. One or more vias (102) are used to connect individual upper connecting plate (100) and individual lower connecting plate (101) to form the overall helix structure. The addition of the parallel flanges to upper and lower connecting plates allow for a greater coupling efficiency per unit length of transmission line 103.

With regard to the Examiner objection to the specification, and the indication of subject matter not entered on page 3, line 13 will not be entered, this had been noted by Applicant. With the Examiner's permission, this specific amendment will not be entered. Other additional amendments have been made that are consistent with the Examiner's requirements. In that amendments were entered to different lines than those indicated in the amendment, Applicant has made its best attempt to correct the wording and syntax such that the specification should now be in a correct format. Applicant would be willing be make any specific amendment to the specification and if not correct, the Examiner is requested to telephone the undersigned. It should noted however that contrary to the Examiner's comments, no amendments to the drawings were done in the first response. Accordingly, it is unclear how to respond to the Examiner's comments in this regard.

As far as the rejection on the merits, claims 2, 3, 4-11, 12-24, 25-29, 30, 31 were rejected under §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In response thereto, Applicant has addressed

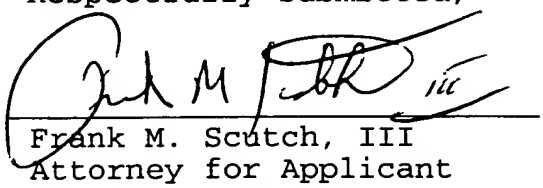
items in the first office action in detail to amend each of the areas outlined by the Examiner. In view of these amendments, it is respectfully requested that the rejection under §112 should now be withdrawn.

Finally, the Examiner has rejected claims 30-31 under §102(b) as being clearly anticipated over Peter (of record). In response thereto, claims 30, 31 have now been withdrawn and it is requested this rejection also be withdrawn.

Accordingly, this application is now believed to be in proper form for allowance. An early notice thereof is respectfully requested. No amendment made was related to the statutory requirements of patentability unless expressly stated herein; and No amendment made was for the purpose of narrowing the scope of any claim, unless Applicant has argued herein that such amendment was made to distinguish over a particular reference or combination of references. Should the Examiner have any comments or suggestions to expedite the allowance of this application, he is respectfully requested to telephone the undersigned.

Please charge any fees associated herewith, including extension of time fees, to deposit account no. 50-0757.

Respectfully submitted,

By: 

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Version with markings to show changes made

FIG. 2 illustrates a 3-D multi-plane coupling structure of the prior art with the associated upper and lower coupling plates 200 and 202 with current vectors ("i_o" and "i_2" respectively). [Note that the]The [and]coupling plates 200 and 202 have an H-field generated by RF current "i_i" propagating along transmission line 201 that induces H-fields of like polarity on coupling plates 200 and 202 for the surface facing the transmission. In other words, the [H filed]H-field for the lower side of upper plate 200 is vectored the same as the top side of transmission line 201, and the H field for the top side of lower plate 202 is vectored the same as the lower surface of transmission line 201. These time varying magnetic fields generate current vectors i_o and i_2 respectively. [polarities that are additive to the corresponding transmission line 201]. It is important to note that the H-field polarity of the lower surface of upper plate 200 CONFLICTS with the top surface polarity of lower plate 202. Thus, regions where the upper and lower plate overlap will cause reduced coupling efficiency, due to H-field cancellation, if they are electrically connected together (i.e.[:] Current flows in the same direction in both structures). It is therefore imperative that the multi-layered helical geometry minimize regions of overlap between differing planes having current vectors oriented in the same direction.

CLAIMS

Cancel Claims 18, 30 and 31.

2. (Once Amended) A device as in claim 1, wherein the at least one transmission line, at least one forward coupler, and at least one reverse coupler are [a] microstrip resonators.

3. (Once Amended) A device as in claim 1, wherein the at least one transmission line, at least one forward coupler, and at least one reverse coupler are [a] stripline resonators.

4. (Twice Amended) A multi-element directional coupler used with a multi-layer printed circuit board comprising:

a first coupling structure connected to a radio frequency source;

a plurality of second coupling structures positioned above the first coupling structure [for coupling radio frequency (RF) energy];

a plurality of third coupling structures positioned below the first coupling structure [for coupling RF energy];

a plurality of vias for connecting individual segments of the plurality of second coupling structures with individual segments of the plurality of third coupling structures so as to provide a helix structure with axis of rotation centered around the first coupling structure;

a plurality of secondary plates embedded into the plurality of second coupling structures;

a plurality of secondary plates embedded into the plurality of third coupling structures;

a ground layer positioned above the plurality of second coupling structures for providing isolation; and

a ground layer positioned below the plurality of third coupling for providing isolation.

11. (Twice Amended) A multi-element directional coupler according to claim 4, wherein the plurality of secondary plates embedded into the plurality of third coupling structures are [is] positioned parallel with the first coupling structure.

12. (Twice Amended) A radio frequency (RF) power coupling device comprising:

at least one transmission line for conducting RF energy applied thereto;

a first plurality of upper connecting structures positioned above the at least one transmission line for providing connectivity for coupled RF energy traveling on the at least one transmission line;

a second plurality of lower connecting structures positioned below the at least one transmission line for providing connectivity for coupled RF energy applied thereto and traveling on the at least one transmission line;

a plurality of vias for connecting individual segments of the first plurality of upper connecting structures with individual segments of the second plurality of lower connecting structures so as to provide a helix geometric structure;

a first ground layer positioned above the plurality of upper connecting structures for isolating the at least one transmission line and the plurality of upper connecting structures from outside RF interference; and

a second ground layer positioned below the plurality of lower connecting structures for isolating the at least one

transmission line and the plurality of lower connecting structures from outside RF interference; and

wherein at least one via of the plurality of vias is positioned a predetermined distance from the transmission line for increasing coupling between the at least one transmission line and the helix structure.

15. (Twice Amended) A radio frequency power coupling device as in claim 12, wherein the at least one transmission line, the first plurality of upper connecting structures and the second plurality of lower connecting structures are a stripline resonator.

19. (Once Amended) A radio frequency power coupling device as in claims 16[,]or 17 [or 18] wherein the at least plurality of upper connecting structures and plurality of lower connecting structures are planar.

20. (Once Amended) A radio frequency power coupling device as in claim 16[,]or 17 [or 18] wherein the secondary structure [which is embedded into the plurality of connecting structures] is parallel with the at least one transmission line, for increasing coupling between the at least one transmission line and helix geometric structure.

21. (Once Amended) A radio frequency power coupling device as in claim 16[,] or 17, [or 18] wherein the at least one transmission line is positioned on a first substrate.

24. (Once Amended) A radio frequency power coupling device as in claim 22, wherein the second substrate and [the] a third

substrate are asymmetrically positioned a predetermined distance from the first substrate.

25. (Twice Amended) A method of increasing the coupling coefficient of a directional coupler device which includes [at least one] a transmission line and at least one magnetic field coupling [device] structure comprising the steps of:

positioning [an upper] a first interconnecting structure in a second plane parallel to and [above] in an adjacent plane with the transmission line;

positioning a [lower] second interconnecting structure in a third plane parallel to and [below] in an adjacent plane with the transmission line;

aligning at least one magnetic field coupling [structure] at a predetermined distance from and parallel to the [at least one] transmission line;

electrically interconnecting the at least one magnetic field coupling structure with the [upper or lower] first and second interconnecting structure; and

electrically interconnecting the [upper and lower] first and second interconnecting structure using at least one via.

29. (Twice Amended) A method as in claim 25, wherein the at least one transmission line, the upper interconnecting structures and the lower interconnecting structures are a stripline resonator.